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Shaug. No.

EEB REVIEW

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TYPE PRODUCT Insecticide/miticide

PRODUCT MANAGER D. Stubbs (41)

PRODUCT NAME Agri-mec 0.15 EC (Avermectin)

COMPANY NAME State of Washington

SUBMISSION PURPOSE Proposed Section 18 for use on pears

in Washington

SHAUGHNESSEY NO.	CHEMICAL	%AI
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<u>122804</u>	<u>Abamectin</u>	<u></u>
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ECOLOGICAL EFFECTS BRANCH REVIEW
SECTION 18

Avermectin

100 Section 18 Application

100.1 Nature and Scope of Emergency

The State of Washington requests a specific exemption to use Avermectin on pears in Washington. The spider mites have become a serious pest and has become resistant to existing pesticides. Avermectin is expected to be able to control this pest.

100.2 Target Organism

Spider mites

100.3 Date, Duration

Spring and summer, 1988.

100.4 Application Methods, Direction, Rates

Use rate would be 0.012 to 0.023 lb. ai/acre (10-20 fl. oz. formulated product per acre). Maximum of 2 applications.

100.5 Treatment Area

All pear-growing areas east of the crest of the Cascade Mountains: Chelan, Douglas, Okanogan, Grant, Franklin, Klickitat, Benton, and Yakima Counties. A total of 19,400 acres.

100.6 Precautionary Labeling

No precautionary labeling was provided.

101 Hazard Assessment

101.1 Discussion

Avermectin would be applied at 0.023 lb. ai/acre. The maximum number of applications would be 2 per season.

101.2 Likelihood of Adverse Effects on Nontarget Organisms

See previous review dated 3-17-88 for a summary of the known toxicity and environmental fate information on avermectin.

Terrestrial Exposure

If abamectin is applied at 0.023 lb. ai/acre, the following residues may occur on terrestrial food items.

	<u>Short Grass</u>	<u>Long Grass</u>	<u>Leafy Crops</u>	<u>Insects Forage</u>	<u>Seed Pods</u>	<u>Fruit</u>
Maximum	5.5	2.5	2.9	1.3	0.3	0.2
Typical	2.9	2.1	0.8	0.8	0.07	0.03

However, rapid degradation in light ($t^{1/2} < 1$ day) should preclude accumulation on food items between treatments.

Birds

These residues do not exceed the lowest avian dietary LC50 of 383 ppm nor the avian reproductive NOEL of 12 ppm. Therefore, no acute or chronic hazard to birds is expected.

Mammals

Using an acute oral LD50 of 10 mg/kg for adult rats the following 1-day adult LC50 values (ppm) were calculated¹ for selected mammals. The weanling 1 day LC50 values were based on a 1.5 mg/kg LD50 for weanling rats. The third column in the table is the extrapolated reproductive NOEL's (ppm) based on the rate 1-generation reproductive test². The weight and food consumption data are from Davis and Golly (1963).

<u>Grazing Herbivores</u>	<u>1 day LC50 (ppm)</u>		<u>Rep. NOEL (ppm)</u>
	<u>adult</u>	<u>weanling</u>	
Meadow vole	16	2.5	0.16
Swamp rabbit	24	3.6	0.24
Deer	412	61.4	4.12
<u>Granivores</u>			
Red squirrel	142	21.3	1.4
<u>Omnivores</u>			
Deer mouse	51	7.7	0.5
Marsh rice rat	218	32.6	2.2
Raccoon	470	70.8	4.7

¹ LC50 (ppm) = LD50 X wt (g) / consumption in one day (g).

² Reproductive NOEL = rat NOEL X wt (g) / consumption in one day (g).

Insectivores

Least shrew	9	1.4	0.09
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Carnivore

Least weasel	40	6	0.4
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The extrapolated adult LC50's are not exceeded by the estimated residues on terrestrial food items. The estimated residues on short grass equal the LC50 for weanling meadow voles. Therefore acute effects may occur to certain young mammals. Based on the extrapolated reproductive NOEL's, it is likely that when ingesting food items containing typical residues, grazing herbivores, omnivores, and insectivores of small size would receive greater than their reproductive NOEL. Granivores and carnivores would not likely ingest food with residues greater than their reproductive NOEL. With multiple applications, and considering the degradate is apparently as toxic, to mammals chronically, as the parent, there is a possibility that small mammal species may experience adverse chronic effects occasionally. These effects would be reduced by the fact that only two treatments per season are permitted and the degradate is not persistent.

Aquatic

Because of its low solubility (7.8 ppb) and high octanol water partition coefficient (9.9×10^3), minimal transport of abamectin by runoff (i.e. 1 %, 0.01) is expected. Based on a scenario of 10 treated acres draining into a 1 acre pond 6 feet deep, the following concentration is derived.

$$10 \text{ acres} \times 0.023 \text{ lb ai/A} \times 0.01 \times 61 \text{ ppb}^3 = 0.014 \text{ ppb}$$

This is less than the aquatic invertebrate chronic NOEL of 0.03 ppb. It is also less than the validated LC50 for shrimp, and the EC50's for oysters and Daphnia magna. Additional unvalidated data suggest Avermectin may be much more toxic to shrimp than originally thought. A full assessment of hazard to aquatic organisms cannot be completed until the data on toxicity to shrimp has been submitted. It does not exceed the lowest fish LC50 nor the fathead chronic NOEL. It does not exceed 0.1 of the fish early life stage NOEL.

Rainbow trout LC50=3.2 ppb

Rainbow trout early life stage NOEL=0.52 ppb

³ If 1 lb ai/acre is applied to 6 feet of water, the resulting concentration would be 61 ppb.

Even though this is a ground application, drift is expected since mist blowers would be required for coverage. Exposure to aquatic and estuarine organisms is possible through drift. The application rate is 0.023 lb. ai per acre. It is assumed that 5% of the sprayed pesticide would drift.

$$0.023 \text{ lb. ai/A} \times 0.05 (\%) = 0.00115 \text{ lb. ai/A drifts}$$

<u>water depth</u>	<u>concentration (ppb)</u>
6'	0.07
3'	0.14
1'	0.42
6"	0.84

These levels are greater than the aquatic invertebrate chronic NOEL of 0.03 ppb. The concentrations in shallow water (up to 1 foot) would exceed the Daphnia magna and shrimp LC50's (0.22-0.34 and 0.2 ppb, respectively). They also approach or exceed the rainbow trout chronic NOEL. These concentrations do not exceed the fish or oyster acute effect levels.

Rainbow trout LC50=3.2 ppb

Rainbow trout early life stage NOEL=0.52 ppb

Summary

Based on the above assessment using validated toxicity information, nonendangered aquatic or estuarine organisms will experience some acute and chronic effects from drift. This assessment does not take into account the new and unvalidated test results suggesting that abamectin is substantially more toxic to shrimp than previously thought⁴. Before EEB can complete a risk assessment for the effect of avermectin on aquatic organisms, further information on these tests will be required.

Nonendangered birds will experience minimal acute and chronic effects. Large mammals would not experience adverse acute effects, nor would granivores or carnivores experience reproductive effects. However, weanling rodents (meadow voles) may experience acute effects, and grazing herbivores, omnivores and insectivores of small size would receive greater than their reproductive NOEL. This use of abamectin represents a hazard to these mammals and possibly certain exposed reptiles and terrestrial amphibians. Terrestrial field testing would be required before EEB could conclude safety from such exposure.

⁴ See review dated 12-30-87, 96-hour flow-through LC50's of 51 and 11 ppt were reported. No information on the test was provided.

101.3 Endangered Species Considerations

The endangered species triggers are:

<u>Group</u>	<u>Trigger</u>	
	<u>Rep. NOEL</u>	<u>Acute</u>
Birds	12 ppm	38.3 ppm (LC50 / 10)
Mammals,	0.09 ppm	0.14 ppm (LC50 / 10)
Reptiles & Terr. Amph.		
Fish	0.52 ppb	0.32 ppb (LC50 / 20)
Aquatic inv.	0.03 ppb	0.022 ppb (LC50 / 20)

Estimated residues on terrestrial food items are:

	<u>Short</u> <u>Grass</u>	<u>Long</u> <u>Grass</u>	<u>Leafy</u> <u>Crops</u>	<u>Insects</u> <u>Forage</u>	<u>Seed</u> <u>Pods</u>	<u>Fruit</u>
Maximum	5.5	2.5	2.9	1.3	0.3	0.2
Typical	2.9	2.1	0.8	0.8	0.07	0.03

Maximum residues do not exceed the avian endangered species triggers. Adverse effects to birds are not expected.

Maximum residues do exceed both the mammalian acute and chronic triggers. The only mammal possibly susceptible would be the Columbian White-tail deer (Odocoileus virginianus leucurus). In Washington, it occurs only in Wahkiakum County; no use is proposed in that county. It is not likely to affect carnivores, since abamectin does not have a high bioaccumulation factor (69X: whole fish, 30X: fillet, 110X: viscera).

The endangered Oregon silverspot butterfly would not be affected by an insecticide use on pears⁵.

The estimated concentration in water adjacent to a treated pear orchard would be 0.014 ppb from runoff and up to 0.84 ppb (6 inches of water) from drift (5% since mist blowers may be used).

$$10 \text{ acres} \times 0.023 \text{ lb ai/A} \times 0.01 \times 61 \text{ ppb}^6 = 0.014 \text{ ppb}$$

⁵ According to the July 31, 1985 USFWS opinion for carbosulfan on apples and pears.

⁶ If 1 lb ai/acre is applied to 6 feet of water, the resulting concentration would be 61 ppb.

This concentration (from runoff) does not exceed any available trigger for endangered aquatic species. Exposure from drift does exceed triggers, however, there are no endangered aquatic species in the area where avermectin would be used.

Summary

Based on available information, use of Abamectin in Washington on pears is not expected to affect endangered species.

101.4 Adequacy of Data

The available data were not adequate to quantify the risks of this section 18 to nonendangered species.

The Agency is awaiting additional information on the toxicity of avermectin to shrimp⁷. When these data have been submitted, EEB will be able to complete a risk assessment for aquatic organisms. Also, terrestrial field testing is required to negate hazards to mammals which were assumed based on comparison of laboratory effects data to estimated exposure.

101.5 Adequacy of Labeling

The following labeling would be required on any avermectin label.

"This product is toxic to fish and wildlife. Keep out of lakes, ponds or streams. Do not contaminate water when disposing of equipment washwater.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow drift to blooming crops or weeds if bees are visiting the treatment area."

⁷ The registrant is attempting to conduct a shrimp life cycle test. Also, additional information on previously conducted acute tests on shrimp is being requested, see 12-30-87 review.

103 Conclusions

The EEB has reviewed the Section 18 emergency exemption requested by Washington. Based on the use information, this exemption may have adverse acute and chronic effects on mammals. The risk assessment for aquatic organisms cannot be completed. although acute and possibly chronic effects to aquatic invertebrates would be expected. Adverse effects to endangered or threatened species are not expected.

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